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THE PRODUCTION AND CONSUMPTION OF THE PRECIOUS METALS.[1]

II. SILVER.

I.

THE production of silver in the United States is calculated upon the same method as that of gold. The results, though closely approximating the actual production, are not as accurate, however, as the statistics of the gold production. Whereas in the latter case the variance between the two calculations for 1899–1901 did not exceed a fraction of 1 per cent., the discrepancy in the case of silver was, as a rule, much higher.

The present practice of making two estimates of the production of silver in the United states has been followed since 1889, except in 1891 and 1892, when a different method was pursued. The variances between the two estimates are given in the following table:

Year	Percentage of Annual Output	Year	Percentage of Annual Output
1889	1.3	1897	2.3
1890	1.1	1898	0.4
1893	1.3	1899	2.7
1894	1.0	1900	2.3
1895	0.2	1901	3.1
1896	0.2		

[1] See JOURNAL OF POLITICAL ECONOMY, September, 1902.

The greater inaccuracy in the case of silver is due, in the first place, to the fact that the items entering into the estimate of the silver production are not to the same extent matters of record as those relating to gold; this appears from the following comparison of the recorded portions of the gold and silver products entering into the two estimates based, one upon production, and the other upon consumption:

PERCENTAGE RATIO OF QUANTITY RECORDED TO TOTAL PRODUCT.

Metal	First Calculation			Second Calculation		
	1899	1900	1901	1899	1900	1901
Gold	29	29	28	99	99	98
Silver	0.7	0.7	0.7	95	93	92

A variance not exceeding 3 per cent. must, in view of the limited statistical facilities of the Bureau of the Mint, be regarded as quite unavoidable. That the percentage of error is so small shows that the bureau has succeeded in covering practically the whole silver production of the United States.

The annual production of silver in the United States for the last three years, covered by the reports of the director of the Mint, was as follows:

Years	Kilograms
1899	1,700,000
1900	1,800,000
1901	1,700,000

The amounts given here are the arithmetical means of the two calculations; the error is reduced to a fraction over 1 per cent., being confined to the decimals replaced by ciphers.

The production of silver in the United States has practically remained stationary within the last three years; if there were any changes they were not perceptible with the present statistical methods.

II.

The world's production of silver within the last five years is estimated by the Bureau of the Mint as follows:

Nations	Weight (1 = 100 Metric Tons)					Commercial Value[1] (1 = $1,000,000)				
	1897	1898	1899	1900	1901	1897	1898	1899	1900	1901
United States	17	17	17	18	17	32	32	33	36	33
Mexico	17	17	17	18	18	32	33	33	36	35
South America	6	10	8	8	8	13	18	15	15	16
Australia	4	3	4	4	4	7	6	8	8	8
Germany	2	2	2	2	2	3	3	4	3	3
All others	4	5	4	4	5	9	10	8	10	10
Total	50	54	52	54	54	96	102	101	108	105

The remarkable stability of the silver production of the world, as well as of the chief silver-producing countries, strikes the eye. This resulted in a steady improvement of the prices of silver, which reached its high-water mark in 1901. The recent fall in the price of silver has not as yet been recorded in the Mint reports.

The following classification by geographical divisions is suggestive:

Year	Hundreds of Metric Tons			Percentages	
	American Continent	All Other Countries	Total	American Continent	All Other Countries
1897	42	8	50	84	16
1898	46	8	54	85	15
1899	43	9	52	83	17
1900	45	9	54	83	17
1901	45	9	54	83	17

Five-sixths of the world's production of silver are derived from American mines (combining North America, Central America, and South America). The United States and Mexico, which is economically a dependency of the United States, together furnish two-thirds of the world's supply.

The foregoing figures relating to foreign countries are far from being complete. At one of the sessions of the International Statistical Institute at Christiania, in 1899, Professor Lexis stated

[1] The slight disproportion between weight and value is due to the omission of quantities less than 100 metric tons and amounts less than $1,000,000, fractions less 0.5 being disregarded and fractions over 0.5 being reckoned as 1 unit.

that in collating the data on production and consumption he had discovered a discrepancy as high as one-sixth of the world's production.

The unsatisfactory state of silver statistics can easily be accounted for by the difficulties growing from the present methods of inquiry. The Bureau of the Mint, which is the original authority on the statistics of the precious metals, aims at tracing the silver production to the mines of each country. Still all the silver mined in South America and most of the product of Australia and other countries outside of the United States and Mexico, in all about one-quarter of the world's production, are shipped in ores to English, German, French, and other European smelters. The data relating to exports of ores are derived from customs statistics, and are subject to the usual defects of such statistics. Moreover, in the very nature of the article, its estimate by the shipper himself is largely speculative; the actual contents of the ore can be determined only after smelting. Taking these speculative estimates as a basis, the production of silver is calculated upon the London annual average price of silver. The price fluctuations during the year are quite considerable. The average price per standard ounce (0.925 fine) in 1901 was 27.1861 d.; the maximum reached during the year was $29\frac{9}{16}$ d. in January; the minimum $24\frac{15}{16}$ d. in December. Thus everything contributes toward making the result inaccurate.

It was suggested by the late Dr. Soetbeer that it would be more rational to abandon these impracticable attempts to trace the product to the silver-mining countries; if the estimates of the silver production were based instead upon smelter returns, the error would be materially reduced. The question is discussed at length by the late Director Kimball in his Production Report for 1887. Still his defense of the method followed by the bureau is anything but convincing. It is much weakened by the fact that the method is not pursued by the bureau itself for the United States. It is thought safer to rely upon smelter returns, though agents of the bureau have been at work for years collecting annual statistics directly from mine operators.

There are no mining statistics in the Latin-American countries; so much more reason there is for applying to their production the same method which has given fairly satisfactory results in the United States.

The German Metallgesellschaft and Metallurgische Gesellschaft jointly compile and publish annual statistics of the silver production, based upon smelter returns. The figures of the director of the Mint, giving the estimated production of the mines, are reproduced in parallel columns. In the latest issue the previous estimates of the output of Mexico as far back as 1895 have been revised and reduced by nearly one-half.[1]

The estimated output of silver from smelting works, even after the reduction made with relation to Mexico, was still in excess of the annual production of the mines of the world, as estimated by the Bureau of the Mint. The deficiency, expressed in percentages of the annual output of smelters, varied from year to year as follows:

Year	Per Cent.	Year	Per Cent.
1895	2	1898	5
1896	9	1899	3
1897	9	1900	6

The actual discrepancy must have been much larger, as there is a loss of silver in smelting, for which an allowance is made, usually 5 per cent., in settlements for ore between miners and smelters.

It must be borne in mind, however, that the data of the Metallurgische Gesellschaft likewise contain elements of uncertainty, viz., the figures relating to Great Britain, Turkey, Central and South America, for which there are no direct smelting returns.

A comparison of the two estimates suggests the following classification of the silver-producing countries:

I. Silver-mining countries which import large quantities of foreign silver ore and crude bullion for treatment at its smelters and refineries, viz.: the United States, Germany, Great Britain, the Iberian peninsula, France, and Italy.

[1] *Comparative Statistics of Lead, Copper, Spelter, Tin, Silver, etc.* Compiled by Metallgesellschaft and Metallurgische Gesellschaft. A.—G. Frankfort on the Main, July, 1902. See also the issue for 1901 (quoted in part in *Deutsches Handels-Archiv*, October, 1901, p. 975).

II. Silver-mining countries which confine themselves to smelting exclusively or chiefly domestic ores: Austria-Hungary, Japan, Russia, the Scandinavian peninsula.

III. Silver-mining countries which partly smelt their own ores, partly export them to foreign countries: Mexico, Central and South America, Australia, Turkey.

IV. Silver-mining countries whose entire product is exported and smelted abroad.

V. Belgium, which has no silver mines of her own, but smelts considerable quantities of imported ores.

A comparative table of the production of mines and smelters, following this classification, will be found in the Appendix (Table I). Below are given the percentages, representing the share of each class in the world's production:

Classes	1895		1896		1897		1898		1899		1900	
	Mines	Smelters	Mines	Smelters	Mines	Smelters	Mines	Smelters	Mines	Smelters	Mines	Smelters
I.....	39.5	65.4	45.9	70.3	39.4	71.4	38.0	71.3	38.6	71.7	38.8	73.8
II.....	2.9	2.8	2.8	2.4	2.7	2.4	2.3	2.4	2.3	2.4	2.4	2.2
III.....	55.9	30.6	48.4	26.2	53.7	24.9	56.4	24.6	56.6	23.6	55.6	21.8
IV.....	1.7	....	2.9	....	4.2	....	3.3	....	2.5	....	3.2	....
V.....	....	1.2	....	1.1	....	1.3	....	1.7	....	2.3	....	2.2
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

The superiority of the German method over that of the Bureau of the Mint clearly appears from this table. The countries comprised within classes I, II, and V handle refined bullion, and thus have at least the opportunity to furnish reliable statistical data; as regards classes III and IV, however, accurate information relating to the bullion product of their ores is impossible even with the most ideal organization of mining statistics. Still within those two classes is Mexico, which holds the first place among silver-mining countries, but has no statistics of silver production at all. According to the method of the Bureau of the Mint, from 50 to 60 per cent. of the total output is apportioned to those two classes, whereas, according to the German method, only about one-half of that quantity is traced to them, or less than one third of the total output. Still nearly

the whole error is contained in that difference, which represents the product smelted in the countries of classes I and V from imported ores. On the other hand, the data relating to the smelting product of classes III and IV are derived from the reports of the mints on the coinage of silver, with a small allowance for industrial consumption. If the last-mentioned item is excluded, as purely speculative, the error is reduced to a minimum.

Arranging the silver-producing countries in the order of the volume of their smelting production, we must place at the head of the column the United States, whose share in 1895–1900 exceeded one-half of the world's output; next follows Mexico. The aggregate share of both countries in the production of mines and smelters was as follows:

Year	Mines Per Cent.	Smelters Per Cent.
1895	61	64
1896	66	68
1897	67	67
1898	65	68
1899	66	69
1900	66	71

Of all other countries the greatest activity was exhibited by Germany, whose refined product averaged, within the last six years under review, 8 per cent. of the world's production. The mere juxtaposition suggests the possibility of American control of the silver market.

III.

Coming now to the consumption of silver, we shall have to be contented, for purposes of comparison, with the Mint figures of production, there being no comparable data on the output of smelters covering a sufficient number of years.

Notwithstanding the adoption of the gold standard by the principal nations, the coinage of silver consumes as yet a considerable portion of the annual output, as will be seen from the following table, where, for the sake of uniformity and for the purpose of comparison, all amounts are reduced to United States coining values:

(1 = $1,000,000)

Year	Production	Coinage			
		Total	United States	All Other Countries	
				Value	Percentage of Production
1897	207	167.8	18.5	149.3	72
1898	223	149.2	23.0	126.2	57
1899	216	166.2	26.0	140.2	65
1900	224	177.0	36.3	140.7	63
1901	226	138.9	30.8	100.1	44
Total	1,096	799.1	134.6	656.5	60

The United States is not included in the percentage column, for the reason that the coinage of silver dollars is confined to the stock purchased prior to the repeal of the purchasing clause of the act of July 14, 1890, by the act of November 1, 1893. Thus the coinage of the United States, which is included in the total of the second column, gives an exaggerated appearance to the

(1 = $1,000,000.)

Nations	1897	1898	1899	1900
I. Silver standard or double standard:				
Mexico	19.6	22.1	18.7	17.1
Hongkong	23.8	3.1	34.6	14.9
China	10.6	....	....	....
Persia	....	6.0	....	....
Siam	....	5.3	4.1	0.3
Bolivia	1.2	1.3	1.9	....
France	2.8	12.3	5.2	15.7
Spain	6.7	....	14.9	3.8
All others	6.8	5.1	2.9	2.2
Total	71.5	55.2	82.3	54.0
II. Gold standard:				
Russia	35.4	21.4	21.0	3.9
India	25.2	26.7	7.2	56.0
Great Britain	4.6	6.2	7.9	10.1
Japan	4.3	8.2	4.3	1.3
Germany	....	3.7	4.3	5.7
Portugal	0.9	1.1	2.8	0.6
All others[1]	7.4	3.7	4.9	8.7
Total	77.8	71.0	52.1	86.3

[1] The United States is not included, for reasons stated above.

demand for silver at the mints of the world. However, after eliminating the United States, the demand for silver currency is still considerable, claiming from four-ninths to five-sevenths of the total output, or, in an average for the last five years, 60 per cent.

The distribution of the silver coinage by countries within the four-year period, 1897 to 1900, is given in the table above; the returns for 1901 for some countries are still missing.

SUMMARY BY YEARS AND CLASSES.

Year	Amount (= $1,000,000)		Percentage of Annual Output	
	Silver- or Double-standard Nations	Gold-Standard Nations	Silver- or Double-Standard Nations	Gold-Standard Nations
1897.....	71.5	77.8	35	38
1898.....	55.2	71.0	25	32
1899.....	82.3	52.1	38	24
1900.....	54.0	86.3	24	38

It appears from this table that, with the exception of the year 1899, the demand for silver in gold-standard countries for subsidiary coinage exceeded the aggregate demand coming from silver-standard and double-standard nations. Among the chief consumers of silver, beside Mexico and Hongkong, were Russia and India; these four governments consumed the major portion of the total quantity of silver used in the mints, as shown in the following table:

Year	Millions of Dollars	Percentage of Total Amount Coined
1897	104.0	70
1898	73.3	58
1899	81.5	58
1900	91.9	65

IV.

The gross returns of the operations of the mints, as stated in the previous article, include considerable quantities of worn domestic coin and foreign coin melted and reissued by the mints.

The relative places held by these two items in the United States is the reverse of that previously ascertained for the coin-

age of gold. The following comparative statement of the coinage, domestic recoinage, and the melting of foreign coins at United States mints is compiled from the annual reports of the bureau, as far back as statistics are available:

Fiscal Years	Coining Value		
	Coinage	Domestic Recoinage	Foreign Coin Melted
1873	$ 2,945,795	$ 47,780	$ 279,492
1874	5,983,601	58,552	211,715
1875	10,070,368	14,201	160,691
1876	19,126,502	4,852	141,245
1877	28,549,935	1,028,363	245,614
1878	28,290,825	6,373	343,326
1879	27,227,883	10,608	698,632
1880	27,942,437	39,298	1,064,746
1881	27,649,967	7,307	734,432
1882	27,783,389	727,572	860,836
1883	28,835,470	636,984	1,266,757
1884	28,773,388	152,031	1,984,366
1885	28,848,960	877,565	1,122,077
1886	30,022,348	279,292	812,664
1887	34,366,484	7,561,806	350,599
1888	34,136,095	1,554,330	87,336
1889	34,515,546	509,863	424,437
1890	36,815,837	602,895	1,229,785
1891	38,272,020	824,439	2,548,250
1892	14,989,279	6,511,510	452,076
1893	12,560,936	6,913,180	546,554
1894[1]	6,024,898	6,481,404	653,150
1895	9,069,481	3,899,352	19,771
1896	11,440,641	4,099,579	175,386
1897	24,327,787	2,856,019	130,788
1898	16,485,584	5,443,436	84,137
1899	27,721,587	7,577,841	25,060
1900	31,171,833	4,639,020	57,799
Total	$653,948,876	$63,364,465	$16,711,721

The annual figures are subject to violent fluctuations, but taking the twenty-eight-year period as a whole the amount of domestic recoinages is nearly four times greater than the amount of foreign coin melted. With respect to the comparative importance of the two items the whole period may be divided into three parts: 1873–76, when the deposits of foreign coins exceeded the quantity of worn domestic coin received at the

[1] The excess of recoinage over the total coinage for the year 1894 is explained by the fact that some of the worn coin melted in one year is recoined in the following year.

mints; 1877–91, when this relation was at times reversed; and 1892–1900, when the receipts of worn domestic coin far exceeded those of foreign coin. Comparative data for the three periods are presented in the following table, all amounts representing coining value:

Fiscal Years	Coinage	Domestic Recoinage	Foreign Coin Melted
I. Totals for each period:			
1873–1876.....	$ 38,126,262	$ 125,385	$ 739,143
1877–1891.....	462,030,588	14,818,726	13,771,878
1892–1900.....	153,792,026	48,420,354	2,146,700
In all	$653,946,876	$63,364,465	$16,711,721
II. Annual averages:			
1873–1876.....	$ 9,531,565	$31,346	$ 198,286
1877–1891.....	30,802,039	987,915	918,125
1892–1900.....	17,088,003	5.380,039	238,522

We observe from this table that the remelting of foreign coin, which had in 1877–91 grown to considerable importance, has declined since 1892. Eliminating the year 1877, when the deposits of foreign coin amounted to less than a quarter of the worn domestic coin received, the greatest deposits of foreign coin were contemporaneous with the large purchases of silver by the treasury; since the purchases were discontinued, the deposits of foreign coin have declined to their former normal limit. For the sake of greater accuracy we take the annual averages for 1873–77, 1878–93, and 1894–1900:

Years	Deposits of Foreign Coin
1873–1877 - - - - - -	$207,751
1878–1893 - - - - -	907,806
1894–1900 - - - - - -	164,010

We notice that the deposits of foreign silver coin at the mints have never been large; this is plainly due to the fact that the face value of foreign silver coins is much in excess of their bullion value. For the whole twenty-eight-year period the remelting of foreign silver coin supplied but 2.6 per cent. of the material for coinage, *i. e.*, ten times less than the remelting of foreign gold coin. If the period 1878–93 is eliminated, the percentage is reduced to 1.1 per cent. One would not suppose

that any foreign silver coin would at all be deposited at the mints; the explanation is in the fact that Mexican and South American silver coins circulate in the international market merely at their bullion value.

The recoinage of worn domestic silver coin is growing, notwithstanding the fact that the annual coinage has during 1892–1900 declined by almost one-half from the average for 1877–91. That the deposits of worn domestic silver coin were so insignificant in 1873–76 was due to the fact that nearly all the currency in circulation up to 1879 was paper.

The ratio of domestic recoinage to the total amount coined was as follows:

Years	Per Cent.
1873–1876	0.3
1877–1891	3.2
1892–1900	31.6
For the period, 1873–1900	9.7

The ratio of silver recoinages to the total coinage for 1873–1900 was more than twice as high as the percentage of gold recoinages for the same period (3.9 per cent.), and for the latest period, 1892–1900, sixteen times as high as the percentage of gold recoinages for the same time. The difference is partly due to the fact that most of the silver recoined was fractional currency. The total number of silver dollars recoined in 1883–1900 was 174,025, whereas the total amount of domestic recoinage for the same period was $61,419,559; thus silver dollars amounted to but 0.3 per cent. of the total. The values of the silver coins melted ranged from 10 to 50 cents, whereas the lowest value of a gold piece was $2.50. The greater percentage of recoinage in the former case was due to greater frequency of circulation.

V.

Reliable data showing the distribution of the deposits at the mints into domestic and foreign coin are available only for the United States. The data relating to foreign countries are incomplete and fragmentary. All available information scattered in

the annual reports of the director of the Mint has been compiled in the following table:

Nations	Total Coinage	Foreign Coin Melted	
		Total	Percentage of Coinage
I. Austria-Hungary:			
1894	$10,742,232	$ 540	0.005
1895	9,056,188	2,446	0.03
1896	7,904,911	4,573	0.06
1897	5,722,330	3,927	0.07
1898	1,369,352	.....	.....
1899	3,176,056	11,353	0.36
1900	4,937,839	102	0.002
Total	$42,808,908	$22,941	0.05
II. Great Britain:			
1898	$ 6,200,237	$135,413	0.2
1899	7,910,885	555,069	0.7
Total	$14,111,122	$690,482	0.5
III. Russia:			
1898	$21,373,189	$1,350	0.006
1899	20,967,769	2,556	0.012
Total	$42,340,958	$3,906	0.009
IV. Siam:			
1892	$6,631,256	$1,991,515	30
1894	2,338,288	2,291,194	94
1895	2,589,823	2,589,823	100
Total	$11,559,367	$6,872,532	59
V. Japan:			
1892	$ 12,307,062	$ 221,430	1.8
1893	12,300,705	740,968	6.0
1894	24,131,363	.....	.....
1895	23,883,505	.....	.....
1896	13,399,062	709,507	5.3
1897	4,296,028	.....	.....
1898	8,159,857	.....	.....
1899	4,363,709	105	0.002
1900	1,295,850	169,028	13.04
Total	$104,007,141	$1,841,038	1.8

No foreign silver coin was deposited at the mints of Great Britain and Russia in 1900; none at the mints of Germany in 1892–1900. In Spain there was melted in 1893 foreign silver coin to the amount of $193,940, *i. e.*, 5.9 per cent. of the total silver coinage for the year, and in Portugal, in 1898, an amount equal to $202,979, *i. e.*, 18.4 per cent. of the year's silver coinage.

It is apparent that the melting of foreign silver coin at the mints of the principal nations is quite insignificant. In Siam, on

the contrary, the operations of the mint were for two years confined to the melting of foreign coin. The volume of silver coinage of the nations named, including the United States, amounted in 1898 to 46 per cent., and in 1899 to 43 per cent., of the world's silver coinage. It would not be quite safe to generalize from those figures. We shall therefore proceed to examine the data relating to recoinages, regardless of the origin of the coins melted.

Comparable data are available for eight nations only, viz.: the United States, Austria-Hungary, the British empire, France, Germany, Japan, Netherlands, and Russia, and that as far back only as 1892. They will be found in full in the Appendix (Table II). Below are given the ratios of the recoinages to the total silver coinages of the several nations:

Nations	Recoinage Per Cent.	Nations	Recoinage Per Cent.
British Empire	16.4	Germany	100
United States	35.5	France	87.6
Russia	5.9	Netherlands	87.7
Japan	1.8		
Austria-Hungary	41.2	Total	23.3

As regards the recoinage of silver coins, there is no similarity between the several nations; whereas in Germany the mints have, since 1892, been confined to the recoinage of old coins, in Russia and Japan the part of recoinage was unimportant. Nor was the relation uniform from year to year for any one nation or for all nations in the aggregate (see Table II in the Appendix). Some regularity is perceivable, however, if the whole period is divided into two parts: 1892–96 and 1897–1900, with roughly equal volumes of coinage:

(1 = $1,000,000)

Periods	Coinage	Recoinage	
		Amount	Percentage of Coinage
1892–1896	377.46	83.04	22
1897–1900	410.46	100.84	24
Total.....	787.92	183.88	23

It would not be safe to extend these results to other nations, inasmuch as the preceding tables embrace only 60 per cent. of the world's coinage for 1892–1900. According to available information, the recoinages of other nations aggregated within the same time, in round numbers, $47,000,000 (coining value), but the data are fragmentary and utterly incomplete.

With regard to the United States, Austria-Hungary, and the British empire there are comparable data going as far back as 1884; they are presented in the following table:

(1 = $1,000,000)

Years	United States		Austria-Hungary		British Empire	
	Coinage	Recoinage	Coinage	Recoinage	Coinage	Recoinage
1884.....	28.53	1.66	4.99	0.50	20.56	2.24
1885.....	28.96	2.03	4.15	0.22	52.03	3.74
1886.....	32.09	1.32	4.38	....	29.15	4.83
1887.....	35.19	8.52	5.56	0.19	48.28	5.07
1888.....	33.03	0.51	5.52	0.24	39.98	4.10
1889.....	35.50	1.17	4.53	0.28	48.79	5.86
1890.....	39.20	3.87	3.86	0.98	66.26	4.79
1891.....	27.52	4.86	3.36	0.69	37.81	2.93
Total.....	260.02	23.98	36.35	3.05	342.86	33.56

The comparative ratios of recoinage to total coinage for the two periods, 1884–91 and 1892–1900, are as follows:

Nations	1884–91, per Cent.	1892–99, per Cent.
United States - - - - -	9.2	35.5
Austria-Hungary - - - -	8.4	41.2
British empire - - - - -	9.8	16.4

Recoinage has within the latest period considerably gained in importance in the operations of the mints, which is evidently the outcome of recent monetary reforms, viz., the repeal of the purchasing clause of the Sherman Act, the closure of the mints of India, and the introduction of the new standard in Austria-Hungary. To eliminate the immediate effect of these events, the annual averages are compared in the table below for the period ending in 1893 and for the years following:

Nations	Amounts (1 = $1,000,000)		Percentages
	Coinage	Recoinage	
United States:			
1884–1893.....	29.15	3.95	14
1894–1900.....	21.70	6.07	28
Austria-Hungary:			
1884–1893.....	6.01	1.41	23
1894–1900.....	6.13	2.35	38
British empire:			
1884–1893.....	44.38	3.81	9
1894–1900.....	26.56	6.05	23

A comparison of the percentages obtained in this and the preceding table shows that by transferring the years 1892 and 1893 to the first period the general tendency has not been changed. Considering the wide difference between the ratios of recoinage for each of these three nations, generalizations from these tables are hazardous. It is doubtless a fact that with these three nations the ratio of recoinage has increased since 1893; but their total coinage for 1892–1900 was, in round numbers, $447,000,000 out of a total of $788,000,000 for the eight principal countries, or 57 per cent.; the remaining 43 per cent. might very materially change the relation.

VI.

Another source of materials for coinage is found in the melting of old silverware, jewelry, etc. The data on this subject are confined to the United States; there are no data whatsoever for any other country.

Since the repeal of the purchasing clause of the Sherman Act, old silverware is received at the mints only for conversion into bars. This particular line of manufacturing, in which our government is exceptionally engaged, is evidently in no way related either to the coinage of silver or to the production of silver bullion from newly mined argentiferous ores. Up to 1893 old silverware was also bought by the mints as material for coinage; a separate account was kept for each item, but the two items are segregated only in the reports for the years 1889–93. In the table below the purchases of old silverware for those five

years are collated with the aggregate purchases of silver under the Bland and Sherman acts:

Fiscal Years	Total Purchases—Ounces Standard	Old Silverware	
		Ounces Standard	Per Cent.
1889.....	26,468,861	558,026	2.1
1890.....	27,820,900	584,745	2.1
1891.....	51,190,493	703,414	1.4
1892.....	54,355,748	636,291	1.2
1893.....	54,008,163	647,476	1.2

The average annual purchases of old silverware amounted, during the quinquennial period under review, to 626,000 ounces; the fluctuations from year to year were insignificant. On the other hand, the doubling of the amount of government purchases of silver had no effect upon the quantity of old silverware brought to the mints. This is quite natural: the increased demand for silver could affect the production of that metal, but not the wear and tear of manufactured silver articles, which depends upon their consumption. To determine this factor, the ratio must be considered which the total quantity of silverware melted at the mints bears to population; the quantity converted into bars for industrial uses must be added to the quantity purchased by the mints. Comparisons from year to year are impossible, because the preceding table relates to fiscal years, whereas the quantities melted into bars are reported for calendar years; it is possible, however, to compare quinquennial periods, viz., 1889–93, and 1894–98, by reducing calendar years to fiscal years. For this purpose we take the total for the calendar years 1889–92 and add to it the arithmetical mean for the calendar years 1888 and 1893; similarly we add the arithmetical mean for the calendar years 1893 and 1898 to the total for 1894–97. The error will be quite insignificant.[1]

[1] Let the amount for the first half of the calendar year 1888 equal a_1, that for the second half a_2, the amounts for 1893, respectively, b_1 and b_2, and let the error be designated by x; we obtain the following equation:

$$x = \frac{(a_1 + a_2) + (b_1 + b_2)}{2} - (a_2 + b_1) = \frac{(a_1 - a_2) - (b_1 - b_2)}{2}.$$

That is to say, the error is equal to one-half of the difference between the semiannual fluctuations for each of the two years.

The ratio to population in the table below is computed by taking the average of the annual estimates given in the *Statistical Abstract of the United States*.

Fiscal Years	Production	Old Silver are Received at the Mints				
		Purchased	Melted into Bars	Total	Per 1,000 Population	Ratio to Production per Cent
	(1 = $1,000,000 Coining Value)					
1889–1893.....	361	3.24	3.69	6.93	$21.60	1.9
1894–1898.....	356	....	5.87	5.87	16.40	1.6
Total.....	717	3.24	9.56	12.80	$18.90	1.8

We note from this table that the receipts of old silverware at the mints were an unimportant item in the silver market, adding less than 2 per cent. to the supply of bullion from domestic mines. The fluctuations were within narrow limits. The discontinuance of government purchases was followed by an increased consumption of old silverware in the arts.

VII.

Having examined singly all items of the world's silver account, we may now strike the balance. If we add to the total output of silver for a given period the amount of recoinage and the quantity of old silverware melted into coin, and deduct from the sum the total coinage, the surplus will represent the supply of newly mined silver for use in the arts. The data for such a calculation are more or less complete only for 1892–1900.

In regard to the United States our calculation must be modified by substituting the government purchases of silver for the amounts coined, inasmuch as all silver dollars, and since the passage of the act of March 14, 1900, all fractional currency, were coined from the stock which had accumulated in the treasury from former purchases. To simplify the computation, we deduct from the world's coinage all silver dollars coined during the period 1892–1900 and the subsidiary currency coined in 1900 under the new act, and add the purchases of 1892 and 1893.

GAINS.

	Coining Value (1 = $1,000,000)
Production	1,916
Recoinage:	
a) In eight principal countries	184
b) In all others	47
Old jewelry melted at United States mints, 1892–93	1
Total	2,148

LOSSES.

World's coinage, deducting United States coinage under Acts of 1890 and 1900		1,297
Purchased by United States government:		
From January 1 to June 30, 1892	27	
From July 1, 1892, to November 1, 1893	66	93
Total		1,390
Balance		758
		2,148

According to this calculation there was left for consumption in the arts an amount equal to $758,000,000.

The calculation requires several corrections. In the first place, a portion of the surplus may have gone to increase the stock of silver. There are no data on this subject, except for the United States. Were it possible to introduce this item for all nations, the surplus available for industrial consumption would be reduced; consequently the proportionate share of silver coinage would be increased. By disregarding this item we at any rate do not exaggerate the consumption of silver by the mints.

Of the items of "Gains" the amount of production is considerably underestimated. As stated on a preceding page, the bureau estimates for 1895–1900 were from 2 to 9 per cent. short of the estimated production of smelters. Taking the error for 1892–94 to be as high as 9 per cent. of the output of smelters, or 10 per cent. of the bureau estimate, and taking the estimate of the Metallgesellschaft for 1895–1900, we calculate the error for 1892–1900 as follows:

Years		Coining Value (1=$1,000,000)
1892–1894.	Output = $625,000,000, of which 10 per cent. - -	62
1895–1900.	Excess of Metallgesellschaft's estimate over mint figures = 1,900 metric tons, or 1,900,000 kilograms, amounting, at the coining rate of $41.56 per kilogram, to	79
	Total, 1892–1900 - - - - - - - - -	141

The next source of error is the item of recoinages. Among those nations for which the information is fragmentary or wholly lacking are the Latin-American republics and China. The volume of silver coinage in all those countries is very high, presumably also the volume of recoinage. Still the absence of data on the recoinage of those countries does not affect our calculation, inasmuch as their silver production is assumed to be equal to the sum of their coinage and exports. If the former item is exaggerated, the production is also exaggerated by the same amount; the balance left for industrial consumption is therefore unaffected. There still remain those countries which produce no silver, but import silver for their coinage. The coefficients of recoinage obtained above for the eight principal nations vary from 1.8 per cent. for Japan to 100 per cent. for Germany. If we take the latter for all those countries, *i. e.*, if we assume that all their coinage was nothing but recoinage, we shall obtain the maximum addition to the surplus available for industrial consumption. A reference to the annual reports for the respective years brings it up to $85,000,000 over and above the $47,000,000 included in our account.

The supply of old jewelry at the foreign bullion markets is an unknown quantity. As it depends upon the consumption of silverware by the people, which is determined by the standard of living, the coefficient per 1,000 inhabitants of the United States must be accepted as the maximum. This coefficient was found to be equal to $21 60 for the quinquennial period 1889–93, of which about one-half represented material for coinage. Assuming the latter to be equal, in round numbers, to $10 per 1,000 inhabitants, or $2.00 annually, and applying this coefficient to all nations, we obtain for 1892–1900 an additional item of $23,000,000. It must be remembered, on the other hand, that

the per-capita stock of silver currency in the United States on January 1, 1901, amounted to $8.51, whereas the per-capita share for all nations was only $2.89. The situation in this respect has not changed since 1892, as appears from the following table:

Stock of Silver Coin on January 1	Total for the World	In the United States	
		Amount	Per Cent.
	(1 = $1,000,000)		
1892	3,931	624	16
1901	3,841	655	17

Making all these allowances we come to the following account:

	Coining Value (1 = $1,000,000)
Balance of preceding account - - - - -	758
Errors in estimates:	
a) Production - - - - - - -	141
b) Recoinage - - - - - - - -	85
Old silverware melted at the mints - - -	23
Total - - - - - - - - -	1,007

Thus the maximum surplus for industrial consumption amounted to $1,007,000,000, assuming the production equal to (1,916 + 141) = $2,057,000,000. The minimum has been calculated above as amounting to $758,000,000 out of a total production valued at $1,916,000,000. The ratio of industrial consumption to the total production was accordingly within the following limits: minimum 39 per cent.; maximum 49 per cent. The rest, from 51 to 61 per cent., was consumed by the mints. In other words, during the last decade of the century just past, at least *one-half of the world's annual output of silver was converted into currency*.

To ascertain the situation since the demonetization of silver in the principal countries, we eliminate from the preceding calculations the years 1892 and 1893, and thus obtain the following table for 1894–1900:

GAINS.

	Coining Value (1 = $1,000,000)
Production	1,504
Recoinage:	
a) In eight principal countries	93
b) In all others	43
Total	1,640

LOSSES.

World's coinage, deducting United States coinage under Acts of 1890 and 1900	1,006
Balance	634
	1,640

The maximum error was as follows:

Production	51
Recoinage	63
Estimated value of silverware melted at the mints	17
Total	131

The maximum surplus available for industrial consumption was equal to $(634 + 131) = \$765{,}000{,}000$, out of a total production amounting to $(1{,}504 + 51) = \$1{,}555{,}000{,}000$. The minimum was $634,000,000 out of a total equal to $1,504,000,000. Thus the ratio of industrial consumption was between 42 per cent. and 49 per cent. The results for 1894–1900 differ from those for 1892–1900 only by 3 per cent.; considering the speculative character of some of the items of this calculation, the variance may be disregarded.

These figures justify the conclusion that *even after the demonetization of silver by the principal nations, at least one-half of the annual output of silver found its way into circulation.*

VIII.

The data relating to the industrial consumption of silver in the United States are more complete than the statistics of foreign countries on the same subject.

The silver account of one country must include the amounts of imports and exports. A table of imports to and exports from the United States will be found in the Appendix. (Table III.) The customs statistics report the commercial value of ores, the

crude weight and value of silver bullion, and the value of domestic and foreign coin, imported and exported. The value given is commercial value; to eliminate the effects of price fluctuations and make the data comparable, they are reduced in our table to coining value. For this purpose the fine weight of the annual imports and exports was first computed by dividing their reported values by the average price of an ounce of fine silver for the respective year, and then the quantities found were multiplied by the coining value of an ounce of fine silver. The results obtained in this manner are, of course, liable to the inaccuracies of all customs statistics, as has been explained before.

The statistics of the Bureau of the Mint enable us to calculate the distribution of the output of silver in the United States since 1889. To make the results comparable with those obtained for all nations, separate calculations are made for 1889–93 and 1894–1900; the year 1893 is selected as a dividing line to trace the effect of the final demonetization of silver.

GAINS.

	Coining Value (1=$1,000,000) 1889–1893	1894–1900
Domestic production	370	497
Recoinage of domestic and foreign coin	26	42
Old silverware melted at the mints	3	...
Transferred from stock of bullion for coinage under Acts of 1890 and 1900	49	32
Total	448	571

LOSSES.

Purchased by the government under acts of 1878 and 1890	247	...
Coinage of dollars and subsidiary currency	123	131
Net exports[1]	56	398
Total	426	529
Balance	22	42
	448	571

[1] In 1890 the exports included gold and silver ore valued at $1,995,098; the value of each metal contained in the ore was not separately stated. This item is not included in our table; the balance left for industrial consumption appears in consequence greater than the actual amount.

This calculation leaves somewhat over $4,000,000 for industrial consumption previous to the repeal of the purchasing clause, and $6,000,000 a year since.

The percentage of error in the estimated output for the first period was, as stated, 1.3 per cent. for 1889 and 1893, and 1.1 per cent. for 1890; in the absence of similar figures for 1891 and 1892, we allow for those years the highest percentage of error ascertained for any year, viz., 3.1 per cent.; computing the total error for the period 1889–93, we arrive at the figure of $8,000,000, to be added both to the production and the balance of "gains" over "losses." This brings the surplus available for industrial consumption to $30,000,000 out of a total domestic consumption amounting to $(370 + 8 - 56) = \$322{,}000{,}000$; in other words, the United States government purchased during that period 91 per cent. of the whole domestic product remaining at home, which left 9 per cent. for consumption in the arts.

The probable error in the estimated output for the second period is similarly figured at $3,000,000, which will bring the fund available for industrial consumption to $45,000,000 out of a total domestic consumption equal to $(497 + 3 - 398) = \$102{,}000{,}000$. According to this calculation the ratio of the industrial consumption of silver in the United States since its demonetization was 44 per cent. of the domestic consumption, or very close to the lower of the estimated percentages of the world's industrial consumption during the same period, which was 42 per cent. Let us now compare the two periods:

ANNUAL AVERAGES.
(1 = $1,000,000)

	1899–93	1894–1900
Domestic production	75	71
Of which:		
Consumed in the arts	6	6
Net coinage	9	8
Purchased by the government	49	..
Net exports	11	57
Total	75	71

It is apparent from this table that the industrial consumption in the United States was not affected by the repeal of the pur-

chasing clause of the Sherman Act; the discontinuance of government purchases was made up for by an increase of the exports of silver. The ratio of industrial consumption to the total domestic consumption may in consequence appear enormously increased, viz., from 9 per cent. to 44 per cent., whereas in reality it was stationary, averaging $6,000,000 annually throughout each period. If we compare the amount consumed in the arts with the amount coined from new material or from the stock of bullion accumulated through purchase, we obtain the following table:

Disposition	Amounts (1 = $1,000,000)		Percentage	
	1889-93	1894-1900	1889-93	1894-1900
Consumed in the arts	30	45	24	33
Coined	94	89	76	67
Total	124	134	100	100

This table shows that since the demonetization of silver the ratio between industrial consumption and normal coinage has increased approximately from $1 \div 3$ to $1 \div 2$, owing to the reduction of the amount annually coined. Still, now, as before, the demand for silver wanted in the monetary circulation of the United States exceeds the demand for industrial purposes.

IX.

The Bureau of the Mint has made repeated efforts to ascertain the consumption of the precious metals by direct inquiries addressed to the consumers. The subject has been referred to in the previous article on gold. The most complete data were those collected in 1899. As will presently be noticed, these data are greatly at variance with the preceding calculations. Of course, figures relating to one year are not comparable with annual averages for a number of years; their variance therefore in no way impeaches their reliability. Still less satisfactory are the results of a comparison of the aggregate returns from consumers for the year 1899 with the bureau's estimate for the same year. If the preceding calculation is made for the year 1899,

there is hardly anything left for consumption in the arts. It must be borne in mind, however, that both the consumption and the exports of one year may contain large quantities of bullion smelted or imported during the previous year.

With these qualifications the data on consumption in 1899 are given below:

	U. S. Mint and Assay Office Bars	Private Refinery Bars
	Commercial Value	
Sold by private refineries	$1,018,969	$3,575,693
Sold by United States mints and assay offices	$3,653,598	.....
Purchases reported by consumers	3,400,541	3,909,055
Discrepancy between purchases and sales	+ $253,057	− $333,362
Ratio to purchases	+ 7%	− 9%

If it is assumed that the mint bars sold by private refineries to the trade in 1899 were all bought by them during the same year, and are consequently included in the official total of the mints and assay offices, then the small shortage of 7 per cent. is easily explained by the fact that out of a total number of 43,050 inquiries sent and actually delivered to the parties addressed, 13,102, or 30 per cent., remained unanswered.

The excess of 9 per cent. in the reported amount of purchases of private refinery bars over the amount of sales may likewise be due to the fact that out of eighty-one firms addressed by the Bureau of the Mint twenty-one failed to respond. On the other hand, it is probable that a part of the reported value of mint bars sold by private refineries in 1899 was from stock previously purchased; it is further possible that through misinterpretation of the interrogatories some of the bars bought from private refineries, though bearing a government stamp, were reported by consumers as "private refinery bars."

The total industrial consumption reported by purchasers amounted to $7,309,596, exclusive of nuggets bought in the mining districts directly from miners, to the amout of $204,216; as this amount is, however, not included in the estimated silver production of the United States, it is not within our comparisons. The sales of mint and private refinery bars aggregated between

$7,229,291 and $8,248,260; the greater amount includes the value of mint bars sold by private refineries, and, in part at least, duplicated in the total of the sales from mints and assay offices. The discrepancy between total sales and total purchases is between —$80,305 and +$938,664, *i. e.*, between —1 per cent. and +13 per cent. Not all of this silver, however, was produced in 1899; of the total of $7,229,290 only $5,961,320 was new silver, *i. e.*, 83 per cent. At this proportion the maximum consumed in the arts during the year amounted to $6,800,000. These are commercial values; at the average bullion value of the dollar =46.5 cents in 1899, they correspond to an industrial consumption of from $13,000,000 to $15,000,000, which is more than double the average annual consumption calculated above for 1889–93 and 1894–1900. The net exports of silver ore and bullion in 1899 amounted to $23,000,000 (commercial value) out of an annual production of $33,000,000 (commercial value), leaving $10,000,000 for domestic consumption. The ratio of industrial consumption, as reported by consumers, to this balance was not less than 59.6 per cent., whereas, according to the preceding calculations, it averaged at most 44 per cent. The variance, if real, would point to an underestimate of the silver production of 1899, amounting to from $7,000,000 to $9,000,000 (coining value), *i. e.*, from 10 per cent. to 13 per cent. of the estimated amount. It is more probable, however, that the variance is due to a deviation of the figures for 1899 from the average computed for a number of years. It merely indicates that returns for one year, though accurate and laboriously collected, are valueless for statistical purposes.

Still, even if we take $6,800,000 as the value of silver consumed in the arts in 1899, which contains an obvious duplication, the maximum coefficient of industrial consumption of silver in the United States will be 68 per cent., which is far above the maximum coefficient of the world's consumption. This is another proof that in the United States, as well as in the rest of the world, over one-third, and probably as much as one-half, of the total consumption of silver is required to keep pace with the growing volume of circulation.

X.

As has been demonstrated, the coinage of silver still remains a very important, if not the principal, source of the demand for the white metal. Some idea of the relation between supply and demand in the silver market may be gathered from the following table, where the world's production is collated with the world's coinage for the twenty-eight-year period 1873–1900 and with the annual average prices represented by the bullion value of the standard silver dollar:

Calendar Years	Fine Ounces		Coining Value		Bullion Value of a Silver Dollar
	Production	Coinage	Production	Coinage	
1873.....	$63,000,000	$101,741,421	$82,000,000	$131,544,464	$1.004
1874.....	55,000,000	79,610,875	72,000,000	102,931,232	0.989
1875.....	62,000,000	92,747,118	82,000,000	119,915,467	0.961
1876.....	68,000,000	97,899,525	88,000,000	126,577,164	0.900
1877.....	63,000,000	88,449,794	81,000,000	114,359,332	0.930
1878.....	73,000,000	124,671,870	95,000,000	161,191,913	0.892
1879.....	74,000,000	81,124,555	96,000,000	104,888,313	0.869
1880.....	75,000,000	65,442,074	97,000,000	84,611,974	0.886
1881.....	79,000,000	83,539.051	102,000,000	108,010,086	0.876
1882.....	86,000,000	85,685,996	112,000,000	110,785,934	0.878
1883.....	89,000,000	84,541,904	115,000,000	109,306,705	0.858
1884.....	82,000,000	74,120,127	105,000,009	95,832,084	0.859
1885.....	92,000,000	98,044,475	118,000,000	126,764,574	0.824
1886.....	93,000,000	96,566,844	121,000,000	124,854,101	0.769
1887.....	96,000,000	126,388,502	124,000,000	163,411,397	0.758
1888.....	109,000,000	104,354,000	141,000,000	134,922,344	0.727
1889.....	120,000,000	107,788,256	155,000,000	139,362,595	0.723
1890.....	126,000,000	117,789,228	163,000,000	152,293,144	0.809
1891.....	137,000,000	106,962,049	177,000,000	138,294,367	0.764
1892.....	153,000,000	120,282,947	198,000,000	155,517,347	0.674
1893.....	165,000,000	106,697,783	214,000,000	137,952,690	0.604
1894.....	165,000,000	87,472,523	213,000,000	113,095,788	0.491
1895.....	168,000,000	98,128,832	217,000,000	126,873,642	0.506
1896.....	157,000,000	123,394,239	203,000,000	159,540,027	0.523
1897.....	160,000,000	129,775,082	207,000,000	167,790,006	0.467
1898.....	169,000,000	115,461,020	219,000,000	149,282,936	0.456
1899.....	169,000,000	128,566,167	217,000,000	166,226,964	0.465
1900.....	173,000,000	136,907,643	223,000,000	177,011,902	0.480
	$3,121,000,000	$2,864,153,902	$4,035,000,000	$3,703,148,492	

We observe that up to and including 1879 the demand for silver from the mints exceeded the annual output of the mines; in 1880 the amount of the coinage is for the first time exceeded by the output of silver; the relative volumes of production and coinage oscillate in both directions until the year 1888, since

which the excess of the output over the coinage becomes a permanent feature. Throughout this period the value of silver exhibits a falling tendency.

Strong efforts were made in the past by the United States to change the relation between supply and demand by large purchases of silver. To study the effects of this policy annual figures are inadequate, being subject to violent fluctuations. For the purposes of comparison we eliminate the year 1873, when the free coinage of silver was discontinued by law, and divide the twenty-seven-year period, 1874–1900, into four parts: (1) 1874–77, from the demonetization of silver to the passage of the Bland Act; (2) 1878–90, *i. e.*, to the passage of the Sherman Act; (3) 1891–93, from the passage of that act to the repeal of its purchasing clause; (4) 1894–1900, *i. e.*, since the repeal of the purchasing clause and the closure of the mints in India. Only full years are considered. The figures of the Bureau of the Mint relate to fiscal years. They can, however, be easily reduced to calendar years. The government purchases of silver during the fiscal year 1878 fall entirely within the same calendar year, inasmuch as the Bland Act was passed in February. The purchases under the Bland Act for the fiscal year 1891 were all made from July 14 to August 13, 1890. From the date last mentioned to January 1, 1891, there were purchased by the government 21,300,141 ounces of silver. And, lastly, all purchases for the fiscal year 1894 were made prior to November 1, 1893. Reducing, accordingly, fiscal years to calendar years, and taking silver at its coining value ($1.2929 per ounce fine), we obtain the following table:

Years	Average per Year ($1 = $1,000,000)			Index Numbers		Average Bullion Value of the Standard Silver Dollar	Average Ratio of Silver to Gold
	Production	Consumption of the Mints	Excess(+) or Shortage (−)	Production	Consumption of the Mints		
						Cents	
1873.....	81.8	131.5	−49.7	100	100	100.4	16÷1
1874–1877.....	80.2	116.0	−35.8	98	88	94.5	17÷1
1878–1890.....	127.1	139.5	−12.4	155	106	82.5	19÷1
1891–1893.....	196.4	204.1	− 7.7	240	155	68.1	24÷1
1894–1900.....	214.7	148.7	+66.0	262	113	48.6	33÷1

It appears from this table that, with the exception of the brief period 1891–93, the average annual demand for silver was approximately the same as in 1873, whereas the supply has since 1878 been rapidly increasing. Production did not cease growing even after 1893, notwithstanding the heavy decline of the demand. The fall in the price of silver went apace. During the first period, 1874–77, the demand fell off 12 per cent., while the supply remained the same (a difference of 2 per cent. must be disregarded); the price went down 5.5 per cent. During the next period, under the operation of the Bland Act, the demand reached its former level, and even slightly exceeded it, but the supply increased more than one-half; the bullion value of the silver dollar went down 12 cents more. In 1891–93 the demand rose to the level of the supply of the previous period, but the supply outran it again by as much as 85 per cent.; as a result, the bullion value of the silver dollar went down further 14 cents. During the last period the demand sank again well-nigh to the level of 1878–90, but the supply increased still more, resulting in an excess of the production over the consumption of the mints as high as $66,000,000 per year. The value of the silver dollar dropped 19.5 cents, as compared with the former period, and 34 cents as compared with 1878–90. This steady increase of the volume of production notwithstanding the demonetization of silver and the curtailment of the demand for monetary needs justifies the inference that the production of silver is profitable even at a price reduced one-half from the ratio of 16 to 1.

To trace the influence of the financial policy of the United States upon the silver market, the following table is presented:

I. TOTALS FOR EACH PERIOD (1 = 1,000,000 OUNCES).

Periods	Production		Purchased by United States Government		
	Of the World	Of United States	In All	Percentage of Production	
				Of the W'rld	Of United States
1878–1890.....	1,190.7	510.7	312.6	26	61
1891–1893.....	455.8	181.8	147.4	32	81

II. ANNUAL AVERAGES (1 = $1,000,000).

Periods	The United States			The World's Increase (+) or Decrease (−)	
	Government Purchases	Production			
		Amount	Increase (+) or Decrease (−) over Previous Period	Production	Government Consumption
1874–1877	....	36.9	.....	.....	.....
1878–1890	31.0	50.9	+ 14.0	+ 46.9	+ 23.5
1891–1893	63.5	78.3	+ 27.4	+ 69.3	+ 64.6
1894–1900	....	71.0	− 7.3	+ 18.3	− 55.4

As appears from this table, the manifest intent of the Bland Act was to make the government of the United States purchase about five-sixths of the domestic production, estimated at the average annual rate for the five years since the demonetization of silver (1873–77), leaving only about one-sixth for industrial consumption. But immediately upon the enactment of that law the production of silver increased, not only in the United States, but in other countries as well. The increase of the world's production was nearly double the increase of the demand coming from all the governments and one-half in excess of the purchases of the United States treasury. These purchases were quite an important factor in the market, exceeding as they did three-fifths of the domestic production, or one-quarter of the world's production. Yet this was insufficient to counteract the decline in the price of silver. Under the operation of the Sherman Act the amount of government purchases was doubled, but the production of the United States fairly kept pace with the increased demand, while the increase of the world's production was alone more than sufficient to supply the entire demand of the United States treasury. Thus, notwithstanding the fact that the amount of government purchases had reached four-fifths of the domestic production, or one-third of the world's production, the price of silver sank still lower. Throughout these two periods the demand was maintained exclusively by the United States government. During 1878–90 this government purchased annually, on an average, $31,000,000, whereas the annual con-

sumption of the mints of the world increased only by $23,500,000; in other words, if the purchases of the United States government are deducted, the demand of the mints of the world appears to have decreased by $7,500,000 annually. During the next period, under the operation of the Sherman Act, the increase of the world's demand coincided with the amount of the purchases for government account in the United States (each item being about $64,000,000). The discontinuance of these purchases reduced the demand of the governments of the world by a like amount; the demand of all other nations increased only by about $8,000,000 annually; at the same time, the repeal of the purchasing clause reduced but little the production of the United States, viz., by about $7,000,000 annually, or about 10 per cent., whereas the world's production even increased.

Whether the steady growth of the output was attended by a decrease in the cost of production, the statistics of the Bureau of the Mint do not disclose; it is evident that the financial policy of the United States stimulated silver mining; on the other hand, the rapid decline of the price of silver since 1894 follows a sudden change in the relation between supply and demand.

XI.

What is the outlook for silver in the future? The attempt to raise the price of silver by increasing the demand has proved futile. There still remains the other alternative of reducing the output. In line with the present-day tendency of industrial evolution, a consolidation has taken place in the refining of silver. The American Smelting and Refining Co., with its adjunct, the United Metals Selling Co., since 1901, controls substantially the whole of the silver production of the United States and Mexico, or about two-thirds of the production of the world.

The Sherman Act created a market for this silver in the United States. In 1890 and 1891 the imports of silver ores and bullion were slightly in excess of the exports (see Appendix, Table III); in 1892 there was a surplus of exports over imports of the coining value of $10,900,000; in 1893, in anticipation of legislative action, the net exports advanced to $28,700,000; in

1894, after the repeal of the purchasing clause of the Sherman Act, they rose at once to $57,900,000, and have kept at about the same level ever since. The total quantity of exports increased from 1892 to 1900 nearly fourfold. Nearly all of it went to England.

Heretofore London has been the world's distributive center for silver. In 1901 one-half of the world's product of that year was marketed in London. The relative position of the United States as a producer of silver bullion and London as a dealer in silver appears from the following table:

LONDON MARKET, 1901.

Net Imports from:	Commercial Value (1=$1,000,000)	Net Exports to:	Commercial Value (1=$,000,000)
United States	46.9	India and Straits Settlements	37.7
Mexico and S. America	2.0	China and Hongkong	6.2
Other countries	1.1	France	3.3
		Other countries	5.3
Total	50.0	Total	52.5

UNITED STATES, 1901.

Net Imports from:		Net Exports to:	
Mexico	21.1	Great Britain	44.7
Central America	0.5	China and Hongkong	4.5
South America	1.6—24.2	France	1.1
Canada	2.4		
Total	26.6	Total	50.3

The bulk of the London trade, as appears from this table, is in the East, and it depends entirely upon the supply from the United States. This relation between imports from the United States and exports to the East has existed in the London market since 1895, as shown in the table below:

COMMERCIAL VALUE.

(1 = $1,000,000)

Year	Exports from United States to Great Britain	Exports from London to the East
1895	37.3	29.3
1896	47.3	31.5
1897	44.7	34.6
1898	42.6	26.7
1899	43.5	33.9
1900	51.9	53.1
1901	44.7	44.2

Will London retain its position of broker between the United States and the East, now that the exports of silver from the United States are controlled by one powerful combination? The policy of all modern industrial combinations is to eliminate the middleman wherever practicable. Is there any reason in the geographical position of London why it should be used as a point of transshipment for Colorado or Montana silver going to Hongkong? In the light of recent developments in the world's trade it seems probable that the interests controlling the exports of American silver will before long discard London as their agent for the eastern trade. It will no doubt require some time to build up the machinery, but as soon as the American smelting combination is ready to deal directly with India, no serious attempt can be made by London to retain its former position. The imports from Mexico and South America to London amount to less than one-tenth of the American imports from Mexico alone, or to one-twelfth of the imports to the United States from all countries of the American continent. These imports alone, without those from the United States, would hardly suffice to supply the minor buyers in the London market. It is said in mining publications that the price of silver is no longer made in the London market, as heretofore, but that it is determined at the New York office of the smelting combination. As yet it has had no strengthening effect upon the price of silver. Still we learn that one of the first moves of the combination in 1901 was to limit the output of lead with a view to improving prices.[1] Four-fifths of the lead smelted in the United States are derived from argentiferous ores,[2] in which the value of the silver contents is double the value of the lead. Thus the limitation of the output of lead means virtually a limitation of the output of silver. The day may not be distant when the ratio between the values of silver and gold will be fixed in the United States "independently of all other nations," though not as the outcome of bimetallist agitation, but through the agency of combination in the field of industry. As the price of silver has in the past been determined by supply and demand, without any apparent synchronous changes in the cost

[1] *The Mineral Industry*, Vol. X, p. 412. [2] *Twelfth Census*, Vol. X, p. 136.

of production, it is not unreasonable to look for an improvement of the price in the future through an effective regulation of the supply of silver. Such has been the effect of consolidation in other industries, which had previously suffered from what was considered ruinous competition. How far improvement is possible is at present a matter of mere speculation. Precedents are not wanting in recent price statistics of increases as high as 100 per cent. The price of steel billets advanced from $16.62 in January, 1899, to $33.12 in July of the same year; the price of steel rails from $17.50 in December, 1898, to $35 in December, 1899.[1] A similar raise of the price of silver would mean a restoration of the ratio of 16 to 1 by mandate of "Wall street." Under an effective regulation of the silver market it is merely a question of expediency.

There have been no signs of a virtual overproduction of silver beyond the capacity of the market to absorb the surplus created by the falling off since 1894 in the demand of the mints. The accumulation of an annual surplus of $55,000,000 (coining value) would, by 1901, have piled up a stock nearly double the annual product of the mines of the world. There is no evidence of such an overstocking of the silver market. The discontinuance of the purchases of silver for government account in the United States and the closure of the Indian mints, no doubt, produced a temporary derangement of the silver market, which resulted in shutting up many mining establishments in the West. Still a readjustment must have soon taken place, for on the whole there has been no decline in mining activity. The decrease of the demand for government account must have been made up by an increased demand at reduced rates for use in the arts.

What will be the price of silver in the future is therefore purely a mathematical problem in maxima and minima: whether the highest net profits can be realized from a large consumption of silver at low prices, or from a limited output at high prices.

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(*For Appendix see pp. 538–39.*)

[1] *Report of the Industrial Commission*, Vol. XIII, pp. 770, 771.

APPENDIX.

TABLE I.

COMPARATIVE ESTIMATES OF THE SILVER PRODUCT OF MINES AND SMELTERS, 1895–1900.

(Metric tons)

Countries	1895		1896		1897		1898		1899		1900	
	Mines	Smelters	Mines	Smelters	Mines	Smelters	Mines	Smelters	Mines	Smelters	Mines	Smelters
Class I:												
United States	1733.7	2467.0	1830.3	2814.0	1675.6	2850.0	1693.6	2825.0	1703.7	2915.0	1793.4	3310.0
Germany	181.0	392.0	183.3	428.4	171.0	448.0	173.3	480.6	194.2	467.6	168.4	415.7
Great Britain	8.7	420.0	8.2	310.0	7 2	375.0	6.6	310.0	5.8	275.0	6.9	266.0
Spain and Portugal	109.8	83.0	179.8	92.0	71.2	131.0	76.4	114.0	76.4	88.4	99.2	99.9
France	17.6	71.1	16.4	70.5	16.9	80.4	14.3	90.9	14.5	82.1	14.5	85.6
Italy	5.7	44.2	27.2	38.1	22.9	45.3	25.0	43.4	25.5	33.6	23.4	31.2
Total	2056.5	3477.3	2245.2	3753.0	1964.8	3929.7	1989.2	3863.9	2020.1	3861.7	2105.8	4208.4
Class II:												
Austria-Hungary	67.9	60.5	58.0	59.7	61.3	66.8	56.4	59.1	59.0	60.6	61.9	60.6
Japan	67.4	72.5	64.3	64.5	54.4	55.7	60.6	60.9	55.6	56.6	55.6	55.6
Russia	12.5	10.8	10.5	10.4	8.9	8.9	8.7	8.7	4.2	4.2	4.5	4.4
Sweden	1.2	1.2	0.6	2.1	0.6	2.2	2.0	2.0	2.3	2.3	1.9	1.9
Norway	6.1	5.0	5.0	4.7	6.5	5.4	5.4	4.8	5.2	4.6	5.4	5.0
Total	155.1	150.0	138.4	141.4	131.7	139.0	133.1	135.5	126.3	128.3	129.3	127.5
Class III:												
Mexico	1461.0	900.0	1422.3	850.0	1677.0	850.0	1765.1	850.0	1730.1	800.0	1786.9	763.0
Cent. & S. America	1050.5	500.0	560.3	300.0	632.3	300.0	860.0	300.0	793.1	300.0	757.9	300.0
Australia	389.1	237.5	380.7	253.0	369.5	214.7	326.4	173.0	369.3	165.0	415.0	180.0
Turkey	8.1	1.5	7.0	1.5	4.4	1.5	4.4	1.5	4.4	1.5	4.4	1.5
Total	2908.7	1639.0	2370.3	1404.5	2683.2	1366.2	2955.9	1324.5	2896.9	1266.5	2964.2	1244.5
Class IV:												
Canada	55.2	....	99.7	.....	172.9	.....	138.5	....	106.1	.....	138.4	.....
Greece	35.4	.....	32.0	.....	37.4	.....	42.0	.....	36.7	...	36.7	.....
Total	90.6	.....	131.7	.....	210.3	.....	180.5	.....	142.8	...	175.1	.....
Class V:												
Belgium	.....	66.9	.....	59.4	.....	75.7	.....	100.6	.....	120.9	.....	123.0
Grand total	5210.9	5333.2	4885.6	5358.3	4990.0	5510.6	5258.7	5424.5	5186.1	5377.4	5374.4	5703.4

TABLE II.

COMPARATIVE TABLE OF THE SILVER COINAGE AND RECOINAGE OF THE PRINCIPAL NATIONS OF THE WORLD.

(1=$1,000.000, Coining Value)

Nations	1892		1893		1894		1895		1896	
	Coinage	Recoinage	Coinage	Recoinage	Coinage	Recoinage	Coinage	Recoinage	Coinage	Recoinage
Brit. Empire	56.05	2.14	44.85	2.41	6.29	3.02	6.82	2.64	12.05	3.69
Unit. States	12.64	8.46	8.80	7.04	9.20	5.82	5.70	3.57	23.09	4.77
Russia	2.92	3.29	2.50	0.71	0.23	0.21	3.70	0.49	30.99	0.29
Japan	12.31	0.22	12.30	0.74	24.13	....	23.88	....	13.40	0.72
Aust.-Hun.	5.32	1.22	18.47	9.82	10.74	4.82	9.06	3.32	7.90	0.72
Germany	1.24	1.22	2.09	2.09	1.07	1.07	1.83	1.83	2.72	2.72
France	.....	0.65	.....	....	0.77	0.77	1.54	....	.....	....
Netherlands	1.57	1.52	0.56	0.49	0.16	0.10	0.14	....	0.43	0.43
Total	92.05	18.74	89.57	23.30	52.59	15.81	52.67	11.85	90.58	13.34

TABLE II.—*Continued.*

Nations	1897		1898		1899		1900		Total	
	Coinage	Recoinage	Coinage	Recoinage	Coinage	Recoinage	Coinage	Recoinage	Coinage	Recoinage
Brit. Empire	29.81	6.09	32.89	4.34	15.13	6.38	82.95	16.27	286.84	46.98
Unit. States	18.49	5.93	23.03	7.57	26.06	5.55	36.35	9.25	163.36	57.96
Russia	35.39	0.51	21.37	....	20.97	1.77	3.95	.....	122.02	7.27
Japan	4.27	0.14	8.16	....	4.36	....	1.30	0.17	104.11	1.99
Aust.-Hun.	5.72	0.13	1.37	0.08	3.18	1.73	4.94	5.56	66.70	27.50
Germany ..	.....	....	3.70	3.78	4.35	4.27	5.65	5.65	22.65	22.65
France	0.01	....	7.72	7.25	5.21	4.63	1.10	1.03	16.35	14.33
Netherlands	0.96	0.97	0.56	0.17	0.27	0.28	1.24	1.24	5.89	5.20
Total..	94.65	13.71	98.80	23.19	79.53	24.61	137.48	39.27	787.92	183.88

TABLE III.

IMPORTS AND EXPORTS OF SILVER ORES AND BULLION TO AND FROM THE UNITED STATES.

Year	Commercial Value (1=$1,000,000)		Average Bullion Value of a Silver Dollar (Cents)	Coining Value (1=$1,000,000)		
	Imports	Exports		Imports	Exports	Net Imports (+) or Exports (−)
1889.....	13.0	27.2	72.3	18.0	37.6	− 19.6
1890.....	16.5	16.0	80.9	20.4	19.8	+ 0.6
1891.....	14.9	13.0	76.4	19.5	17.0	+ 2.5
1892.....	14.4	21.8	67.4	21.4	32.3	− 10.9
1893.....	14.4	31.7	60.4	23.8	52.5	− 28.7
1894.....	11.4	39.8	49.1	23.2	81.1	− 57.9
1895.....	17.3	46.8	50.5	34.3	92.7	− 58.4
1896.....	22.2	57.3	52.2	42.5	109.8	− 67.3
1897.....	24.4	51.1	46.7	51.1	109.4	− 58.3
1898.....	23.3	47.8	45.6	51.1	104.8	− 53.7
1899.....	26.7	49.8	46.5	57.4	107.1	− 49.7
1900.....	33.4	58.8	48.0	69.6	122.5	− 52.9